

## WEST Search History

DATE: Friday, January 06, 2006

| Hide?                    | <u>Set</u><br><u>Name</u> | <u>Query</u>   | <u>Hit</u><br><u>Count</u> |
|--------------------------|---------------------------|--|----------------------------|
|                          |                           | <i>DB=PGPB,USPT; PLUR=YES; OP=ADJ</i>  |                            |
| <input type="checkbox"/> | L15                       | L14 and ozone  | 3                          |
| <input type="checkbox"/> | L14                       | l2 and (back-grinding)   | 50                         |
| <input type="checkbox"/> | L13                       | L12 and (back-grinding)  | 0                          |
| <input type="checkbox"/> | L12                       | L11 and 134/\$.ccls.   | 21                         |
| <input type="checkbox"/> | L11                       | L10 and (anhydrous or vapor)   | 30                         |
| <input type="checkbox"/> | L10                       | L8 and (HF or (hydrogen fluoride))   | 47                         |
| <input type="checkbox"/> | L9                        | L8 and (hf or (hydrogen fluoride))   | 47                         |
| <input type="checkbox"/> | L8                        | L7 and (bare\$ or uncoated\$)  | 74                         |
| <input type="checkbox"/> | L7                        | l2 and ozone   | 640                        |
| <input type="checkbox"/> | L6                        | L5 and ozone   | 13                         |
| <input type="checkbox"/> | L5                        | L4 and HF  | 20                         |
| <input type="checkbox"/> | L4                        | L2 and (liquid layer)  | 57                         |
| <input type="checkbox"/> | L3                        | L2 with (liquid layer)   | 1                          |
| <input type="checkbox"/> | L2                        | (thinning or etching) with ((silicon wafer\$) or (semiconductor wafer\$) or (flat media) or (workpiece\$)) | 15153                      |
|                          |                           | <i>DB=USPT; PLUR=YES; OP=ADJ</i>   |                            |
| <input type="checkbox"/> | L1                        | 6758938.pn.  | 1                          |

END OF SEARCH HISTORY

## Hit List

[First Hit](#)[Clear](#)[Generate Collection](#)[Print](#)[Fwd Refs](#)[Bkwd Refs](#)[Generate OACS](#)

Search Results - Record(s) 1 through 6 of 6 returned.

☐ 1. Document ID: JP 2001319914 A

Using default format because multiple data bases are involved.

L18: Entry 1 of 6

File: JPAB

Nov 16, 2001

PUB-NO: JP02001319914A

DOCUMENT-IDENTIFIER: JP 2001319914 A

TITLE: METHOD OF MANUFACTURING SEMICONDUCTOR DEVICE

PUBN-DATE: November 16, 2001

INVENTOR-INFORMATION:

NAME

COUNTRY

ROSAMILIA, JOSEPH MARK

SAPJETA, BARBARA JOYCE

INT-CL (IPC): H01 L 21/304; H01 L 21/308; H01 L 29/78

|      |       |          |       |        |                |      |           |            |            |        |     |         |
|------|-------|----------|-------|--------|----------------|------|-----------|------------|------------|--------|-----|---------|
| Full | Title | Citation | Front | Review | Classification | Date | Reference | Examiner's | Attorney's | Claims | KWC | Draw De |
|------|-------|----------|-------|--------|----------------|------|-----------|------------|------------|--------|-----|---------|

☐ 2. Document ID: WO 2005016563 A1

L18: Entry 2 of 6

File: EPAB

Feb 24, 2005

PUB-NO: WO2005016563A1

DOCUMENT-IDENTIFIER: WO 2005016563 A1

TITLE: METHODS OF THINNING A SILICON WAFER USING HF AND OZONE

PUBN-DATE: February 24, 2005

INVENTOR-INFORMATION:

NAME

COUNTRY

BERGMAN, ERIC J

US

INT-CL (IPC): B08 B 3/00

EUR-CL (EPC): H01L021/00

|      |       |          |       |        |                |      |           |            |            |        |     |         |
|------|-------|----------|-------|--------|----------------|------|-----------|------------|------------|--------|-----|---------|
| Full | Title | Citation | Front | Review | Classification | Date | Reference | Examiner's | Attorney's | Claims | KWC | Draw De |
|------|-------|----------|-------|--------|----------------|------|-----------|------------|------------|--------|-----|---------|

☐ 3. Document ID: EP 731498 A2

L18: Entry 3 of 6

File: EPAB

Sep 11, 1996

PUB-NO: EP000731498A2

DOCUMENT-IDENTIFIER: EP 731498 A2

TITLE: Surface processing method and surface processing device for silicone substrates

PUBN-DATE: September 11, 1996

## INVENTOR-INFORMATION:

NAME

COUNTRY

FUKUZAWA, YUJI

JP

MIYAZAKI, KUNIHIRO

JP

INT-CL (IPC): H01 L 21/306

EUR-CL (EPC): H01L021/306

|      |       |          |       |        |                |      |           |           |             |        |      |         |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|---------|
| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | K00C | Draw De |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|---------|

☐ 4. Document ID: WO 2005016563 A1

L18: Entry 4 of 6

File: DWPI

Feb 24, 2005

DERWENT-ACC-NO: 2005-213954

DERWENT-WEEK: 200577

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TITLE: Thinning silicon wafer comprises delivering ozone gas into process chamber to oxidize layer of silicon on wafer, and etching oxidized silicon layer with hydrofluoric vapor to decrease thickness of wafer

INVENTOR: BERGMAN, E J

PRIORITY-DATA: 2003US-0631376 (July 30, 2003)

## PATENT-FAMILY:

PUB-NO

PUB-DATE

LANGUAGE

PAGES

MAIN-IPC

WO 2005016563 A1

February 24, 2005

E

035

B08B003/00

INT-CL (IPC): B08 B 3/00

|      |       |          |       |        |                |      |           |           |             |        |      |         |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|---------|
| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | K00C | Draw De |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|---------|

☐ 5. Document ID: DE 19924058 A1

L18: Entry 5 of 6

File: DWPI

Nov 30, 2000

DERWENT-ACC-NO: 2001-072067

DERWENT-WEEK: 200109

COPYRIGHT 2006 DERWENT INFORMATION LTD

TITLE: Surface decontamination apparatus, especially for organic contaminant removal from a structured silicon wafer or body, comprises an ozone reactor in

which a structured body is heated during ozone exposure

INVENTOR: BECKER, V; LAERMER, F ; OFFENBERG, M ; PETERMANN, G ; SCHIELEIN, D ;  
SCHILP, A ; SKAPA, H

PRIORITY-DATA: 1999DE-1024058 (May 26, 1999)

PATENT-FAMILY:

| PUB-NO         | PUB-DATE          | LANGUAGE | PAGES | MAIN-IPC    |
|----------------|-------------------|----------|-------|-------------|
| DE 19924058 A1 | November 30, 2000 |          | 006   | H01L021/306 |

INT-CL (IPC): H01 L 21/306

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De |
|------|-------|----------|-------|--------|----------------|------|-----------|--------|------|---------|
|------|-------|----------|-------|--------|----------------|------|-----------|--------|------|---------|

☐ 6. Document ID: JP 08045886 A, US 5759971 A, JP 2760418 B2

L18: Entry 6 of 6

File: DWPI

Feb 16, 1996

DERWENT-ACC-NO: 1996-165217

DERWENT-WEEK: 199829

COPYRIGHT 2006 DERWENT INFORMATION LTD

TITLE: Washing liq. for semiconductor wafer - comprises hydrofluoric acid soln.  
saturated with dissolved ozone

INVENTOR: MANAKO, K

PRIORITY-DATA: 1994JP-0179239 (July 29, 1994)

PATENT-FAMILY:

| PUB-NO        | PUB-DATE          | LANGUAGE | PAGES | MAIN-IPC    |
|---------------|-------------------|----------|-------|-------------|
| JP 08045886 A | February 16, 1996 |          | 006   | H01L021/304 |
| US 5759971 A  | June 2, 1998      |          | 000   | C11D007/08  |
| JP 2760418 B2 | May 28, 1998      |          | 006   | H01L021/304 |

INT-CL (IPC): B08 B 3/08; C11 D 7/02; C11 D 7/08; C11 D 7/18; H01 L 21/304;  
H01 L 21/3065

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De |
|------|-------|----------|-------|--------|----------------|------|-----------|--------|------|---------|
|------|-------|----------|-------|--------|----------------|------|-----------|--------|------|---------|

Clear

Generate Collection

Print

Fwd Refs

Bkwd Refs

Generate OACS

| Term                                 | Documents |
|--------------------------------------|-----------|
| HF                                   | 66477     |
| HFS                                  | 121       |
| (17 WITH HF) .EPAB,JPAB,DWPI,TDBD.   | 6         |
| (L17 WITH HF ) .EPAB,JPAB,DWPI,TDBD. | 6         |

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## Generate OACS

Nov 16, 2001

| Full | Title | Citation | Front | Review | Classification | Date | Reference |  |  |  | Claims | KWIC | Draw De |
|------|-------|----------|-------|--------|----------------|------|-----------|--|--|--|--------|------|---------|
|------|-------|----------|-------|--------|----------------|------|-----------|--|--|--|--------|------|---------|

Feb 24, 2005

http://westbrs:9000/bin/gate.exe?f=TOC&state=t4qeto.64.1&p\_u userid=zel-arini&p\_u user=... 1/6/06

NAME COUNTRY  
BERGMAN, ERIC J US

INT-CL (IPC): B08 B 3/00  
EUR-CL (EPC): H01L021/00

## ABSTRACT:

CHG DATE=20050308 STATUS=O>A method of thinning a silicon wafer (60) in a controllable cost-effective manner with minimal chemical consumption. The wafer (60) is placed into a process chamber (45), after which ozone gas (40) and HF vapor (61) are delivered into the process chamber to react with a silicon surface of the wafer. The ozone and HF vapor may be delivered sequentially, or may be mixed with one another before entering the process chamber. The ozone oxidizes the silicon surface of the wafer, while the HF vapor etches the oxidized silicon away from the wafer. The etched oxidized silicon is then removed from the process chamber. As a result, the wafer is thinned, which aids in preventing heat build-up in the wafer, and also makes the wafer easier to handle and cheaper to package. In alternative embodiments, HF may be delivered into the process chamber as an anhydrous gas or in aqueous form.

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Abstract | Claims | Keywords | Drawings |
|------|-------|----------|-------|--------|----------------|------|-----------|----------|--------|----------|----------|
|------|-------|----------|-------|--------|----------------|------|-----------|----------|--------|----------|----------|

☐ 3. Document ID: EP 731498 A2

L18: Entry 3 of 6

File: EPAB

Sep 11, 1996

PUB-NO: EP000731498A2

DOCUMENT-IDENTIFIER: EP 731498 A2

TITLE: Surface processing method and surface processing device for silicone substrates

PUBN-DATE: September 11, 1996

## INVENTOR-INFORMATION:

| NAME               | COUNTRY |
|--------------------|---------|
| FUKUZAWA, YUJI     | JP      |
| MIYAZAKI, KUNIHIRO | JP      |

INT-CL (IPC): H01 L 21/306  
EUR-CL (EPC): H01L021/306

## ABSTRACT:

CHG DATE=19990617 STATUS=O> A silicon wafer (12) is set in a processing bath (11) and an HF water solution and ozone water are respectively supplied from an HF line (13) and ozone water line (14) into the processing bath via an HF valve (19) and ozone water valve (20) to create a mixture. The mixture contains an HF water solution with a concentration of 0.01% to 1% and ozone water with a concentration of 0.1 ppm to 20 ppm, has substantially the same etching rate for silicon and for silicon oxide film and is used at a temperature in the range of 10 to 30 DEG C. The silicon wafer (12) and the silicon oxide film formed on part of the surface of the



wafer can be simultaneously cleaned by use of the above mixture.



|      |       |          |       |        |                |      |           |           |             |        |      |         |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|---------|
| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KM/C | Draw De |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|---------|

☐ 4. Document ID: WO 2005016563 A1

L18: Entry 4 of 6

File: DWPI

Feb 24, 2005

DERWENT-ACC-NO: 2005-213954

DERWENT-WEEK: 200577

COPYRIGHT 2006 DERWENT INFORMATION LTD

TITLE: Thinning silicon wafer comprises delivering ozone gas into process chamber to oxidize layer of silicon on wafer, and etching oxidized silicon layer with hydrofluoric vapor to decrease thickness of wafer

INVENTOR: BERGMAN, E J

PRIORITY-DATA: 2003US-0631376 (July 30, 2003)

PATENT-FAMILY:

| PUB-NO                  | PUB-DATE          | LANGUAGE | PAGES | MAIN-IPC   |
|-------------------------|-------------------|----------|-------|------------|
| <u>WO 2005016563 A1</u> | February 24, 2005 | E        | 035   | B08B003/00 |

INT-CL (IPC): B08 B 3/00

ABSTRACTED-PUB-NO: WO2005016563A

BASIC-ABSTRACT:

NOVELTY - Thinning silicon wafer comprises placing the wafer into a process chamber; delivering ozone gas into the process chamber to oxidize a layer of silicon on the wafer; delivering hydrofluoric acid vapor into the process chamber; and etching the oxidized silicon layer with the hydrofluoric vapor to decrease a thickness of the wafer.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a system for thinning silicon wafers, comprising process chamber(s); wafer holder in the process chamber; ozone source connecting into the process chamber; and hydrofluoric acid (HF) vapor source connected to provide HF vapor into the process chamber, separately, or in combination with ozone from the ozone source.

USE - For thinning a silicon wafer.

ADVANTAGE - The method is capable of thinning a silicon wafer in a controllable cost-effective manner with minimal chemical consumption. The wafer is thinned, which prevents heat build-up in the wafer, and makes the wafer easier to handle and cheaper to package.

DESCRIPTION OF DRAWING(S) - The figure is a schematic diagram of a wafer processing system that may be used to perform the wafer thinning method.

|      |       |          |       |        |                |      |           |           |             |        |      |         |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|---------|
| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KM/C | Draw De |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|---------|

☐ 5. Document ID: DE 19924058 A1

L18: Entry 5 of 6

File: DWPI

Nov 30, 2000

DERWENT-ACC-NO: 2001-072067

DERWENT-WEEK: 200109

COPYRIGHT 2006 DERWENT INFORMATION LTD

TITLE: Surface decontamination apparatus, especially for organic contaminant removal from a structured silicon wafer or body, comprises an ozone reactor in which a structured body is heated during ozone exposure

INVENTOR: BECKER, V; LAERMER, F ; OFFENBERG, M ; PETERMANN, G ; SCHIELEIN, D ; SCHILP, A ; SKAPA, H

PRIORITY-DATA: 1999DE-1024058 (May 26, 1999)

## PATENT-FAMILY:

| PUB-NO                | PUB-DATE          | LANGUAGE | PAGES | MAIN-IPC    |
|-----------------------|-------------------|----------|-------|-------------|
| <u>DE 19924058 A1</u> | November 30, 2000 |          | 006   | H01L021/306 |

INT-CL (IPC): H01 L 21/306

ABSTRACTED-PUB-NO: DE 19924058A

## BASIC-ABSTRACT:

NOVELTY - A structured body surface decontamination apparatus, comprising an ozone reactor (5) in which the body (20) is heated during exposure to an ozone-containing gas, is new,

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a method of eliminating especially organic contaminants from a structured body (20) using the above apparatus.

Preferred Features: The ozone-containing gas comprises oxygen or air containing 1-30 vol.% ozone and the body surface is heated to 150-435 (especially 200-350) deg. C.

USE - Especially for removing organic contaminants from a structured silicon wafer or body by ozone treatment, e.g. before HF gas etching of a sacrificial SiO<sub>2</sub> layer below surface micromechanical structures in sensor manufacture.

ADVANTAGE - The apparatus allows rapid (especially 10-20 min.) in-situ contaminant removal from individual structured bodies immediately prior to HF gas etching.

DESCRIPTION OF DRAWING(S) - The drawing shows an ozone reactor according to the invention.

Ozone reactor 5

Heater 10

Halogen lamp 12

Gas supply 16



Ozone generator 19

Structured body 20

Process chamber 24

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Abstract | Claims | Keywords | Drawings |
|------|-------|----------|-------|--------|----------------|------|-----------|----------|--------|----------|----------|
|------|-------|----------|-------|--------|----------------|------|-----------|----------|--------|----------|----------|

☐ 6. Document ID: JP 08045886 A, US 5759971 A, JP 2760418 B2

L18: Entry 6 of 6

File: DWPI

Feb 16, 1996

DERWENT-ACC-NO: 1996-165217

DERWENT-WEEK: 199829

COPYRIGHT 2006 DERWENT INFORMATION LTD

TITLE: Washing liq. for semiconductor wafer - comprises hydrofluoric acid soln. saturated with dissolved ozone

INVENTOR: MANAKO, K

PRIORITY-DATA: 1994JP-0179239 (July 29, 1994)

## PATENT-FAMILY:

| PUB-NO               | PUB-DATE          | LANGUAGE | PAGES | MAIN-IPC    |
|----------------------|-------------------|----------|-------|-------------|
| <u>JP 08045886 A</u> | February 16, 1996 |          | 006   | H01L021/304 |
| <u>US 5759971 A</u>  | June 2, 1998      |          | 000   | C11D007/08  |
| <u>JP 2760418 B2</u> | May 28, 1998      |          | 006   | H01L021/304 |

INT-CL (IPC): B08 B 3/08; C11 D 7/02; C11 D 7/08; C11 D 7/18; H01 L 21/304; H01 L 21/3065

ABSTRACTED-PUB-NO: JP 08045886A

## BASIC-ABSTRACT:

A washing liq. is formed by directly dissolving ozone as high as satn. solubility in an aq. HF acid having a concn. at up to 20deg.C of 0.03-0.05 wt.%.

Also claimed is that washing of the semiconductor wafer comprises: (a) filling the aq. HF acid mentioned above in a treating vessel; (b) forming a washing liq. by directly dissolving ozone as high as satn. solubility in the aq. acid; (c) soaking a semiconductor substrate in the treating vessel for etching; and (d) supplying pure water or ozone-dissolved water in the treating vessel for rinsing.

USE - The washing liq. is used for washing the semiconductor wafer. The method washes the semiconductor wafer.

ADVANTAGE - The ozone is dissolved as high as satn. solubility. The result exerts high ozone oxidn. action. Etching action provided by HF acid removes a natural oxide film on the surface of the semiconductor to purge metal impurities and particles on and in the film. Ozone gas in the aq. hydrofluoric acid generates a new natural oxide film. Re-etching removes metal and particles adsorbed on the interface of a Si bare surface and the natural oxide film.

ABSTRACTED-PUB-NO:

US 5759971A EQUIVALENT-ABSTRACTS:

A washing liq. is formed by directly dissolving ozone as high as satn. solubility in an aq. HF acid having a concn. at up to 20 deg. C of 0.03-0.05 wt.%.

Also claimed is that washing of the semiconductor wafer comprises: (a) filling the aq. HF acid mentioned above in a treating vessel; (b) forming a washing liq. by directly dissolving ozone as high as satn. solubility in the aq. acid; (c) soaking a semiconductor substrate in the treating vessel for etching; and (d) supplying pure water or ozone-dissolved water in the treating vessel for rinsing.

USE - The washing liq. is used for washing the semiconductor wafer. The method washes the semiconductor wafer.

ADVANTAGE - The ozone is dissolved as high as satn. solubility. The result exerts high ozone oxidn. action. Etching action provided by HF acid removes a natural oxide film on the surface of the semiconductor to purge metal impurities and particles on and in the film. Ozone gas in the aq. hydrofluoric acid generates a new natural oxide film. Re-etching removes metal and particles adsorbed on the interface of a Si bare surface and the natural oxide film.

|      |       |          |       |        |                |      |           |           |           |        |     |          |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-----------|--------|-----|----------|
| Full | Title | Citation | Front | Review | Classification | Date | Reference | Abstracts | Abstracts | Claims | KMC | Draw. De |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-----------|--------|-----|----------|

|       |                     |       |          |           |               |
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| Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS |
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| Term                                    | Documents |
|---|-----------|
| HF                                      | 66477     |
| HFS                                     | 121       |
| (17 WITH HF) .EPAB, JPAB, DWPI, TDBD.   | 6         |
| (L17 WITH HF ) .EPAB, JPAB, DWPI, TDBD. | 6         |

Display Format: REV Change Format

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## WEST Search History





DATE: Friday, January 06, 2006

| Hide?                    | <u>Set</u><br><u>Name</u> | <u>Query</u>   | <u>Hit</u><br><u>Count</u> |
|--------------------------|---------------------------|--|----------------------------|
|                          |                           | <i>DB=EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=ADJ</i>  |                            |
| <input type="checkbox"/> | L19                       | L18 with grinding  | 0                          |
| <input type="checkbox"/> | L18                       | L17 with hf  | 6                          |
| <input type="checkbox"/> | L17                       | L16 with ozone   | 35                         |
| <input type="checkbox"/> | L16                       | (thinning or etching) with ((silicon wafer\$) or (semiconductor wafer\$) or (flat media) or (workpiece\$)) | 8608                       |
|                          |                           | <i>DB=PGPB,USPT; PLUR=YES; OP=ADJ</i>  |                            |
| <input type="checkbox"/> | L15                       | L14 and ozone  | 3                          |
| <input type="checkbox"/> | L14                       | l2 and (back-grinding)   | 50                         |
| <input type="checkbox"/> | L13                       | L12 and (back-grinding)  | 0                          |
| <input type="checkbox"/> | L12                       | L11 and 134/\$.ccls.   | 21                         |
| <input type="checkbox"/> | L11                       | L10 and (anhydrous or vapor)   | 30                         |
| <input type="checkbox"/> | L10                       | L8 and (HF or (hydrogen fluoride))   | 47                         |
| <input type="checkbox"/> | L9                        | L8 and (hf or (hydrogen fluoride))   | 47                         |
| <input type="checkbox"/> | L8                        | L7 and (bare\$ or uncoated\$)  | 74                         |
| <input type="checkbox"/> | L7                        | l2 and ozone   | 640                        |
| <input type="checkbox"/> | L6                        | L5 and ozone   | 13                         |
| <input type="checkbox"/> | L5                        | L4 and HF  | 20                         |
| <input type="checkbox"/> | L4                        | L2 and (liquid layer)  | 57                         |
| <input type="checkbox"/> | L3                        | L2 with (liquid layer)   | 1                          |
| <input type="checkbox"/> | L2                        | (thinning or etching) with ((silicon wafer\$) or (semiconductor wafer\$) or (flat media) or (workpiece\$)) | 15153                      |
|                          |                           | <i>DB=USPT; PLUR=YES; OP=ADJ</i>   |                            |
| <input type="checkbox"/> | L1                        | 6758938.pn.  | 1                          |

END OF SEARCH HISTORY

## Hit List

[First Hit](#)[Clear](#)[Generate Collection](#)[Print](#)[Fwd Refs](#)[Bkwd Refs](#)[Generate ACS](#)

Search Results - Record(s) 1 through 10 of 21 returned.

☐ 1. Document ID: US 20050217707 A1

Using default format because multiple data bases are involved.

L12: Entry 1 of 21

File: PGPB

Oct 6, 2005

PGPUB-DOCUMENT-NUMBER: 20050217707

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20050217707 A1

TITLE: Selective processing of microelectronic workpiece surfaces

PUBLICATION-DATE: October 6, 2005

INVENTOR-INFORMATION:

| NAME               | CITY      | STATE | COUNTRY |
|--------------------|-----------|-------|---------|
| Aegerter, Brian K. | Kalispell | MT    | US      |
| Dundas, Curt T.    | Kalispell | MT    | US      |
| Ritzdorf, Tom L.   | Big Fork  | MT    | US      |
| Curtis, Gary L.    | Loveland  | CO    | US      |
| Jolley, Michael    | Beaverton | OR    | US      |

US-CL-CURRENT: [134/33](#); [134/26](#), [451/46](#)

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KIMC | Draw. De |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|----------|
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|----------|

☐ 2. Document ID: US 20050215063 A1

L12: Entry 2 of 21

File: PGPB

Sep 29, 2005

PGPUB-DOCUMENT-NUMBER: 20050215063

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20050215063 A1

TITLE: System and methods for etching a silicon wafer using HF and ozone

PUBLICATION-DATE: September 29, 2005

INVENTOR-INFORMATION:

| NAME             | CITY      | STATE | COUNTRY |
|------------------|-----------|-------|---------|
| Bergman, Eric J. | Kalispell | MT    | US      |

US-CL-CURRENT: [438/710](#); [134/200](#)

## ABSTRACT:

In a method of etching a silicon wafer in a controllable cost-effective manner with minimal chemical consumption, ozone gas and HF vapor are delivered into a process chamber to react with a silicon surface of the wafer. The ozone and HF vapor may be delivered sequentially, or may be mixed together before entering the process chamber. The ozone oxidizes the silicon surface of the wafer, while the HF vapor etches away the oxidized silicon. In alternative embodiments, HF may be delivered into the process chamber as an anhydrous gas or in aqueous form.

|      |       |          |       |        |                |      |           |           |             |        |      |         |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|---------|
| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|---------|

☐ 3. Document ID: US 20040103919 A1

L12: Entry 3 of 21

File: PGPB

Jun 3, 2004

PGPUB-DOCUMENT-NUMBER: 20040103919

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20040103919 A1

TITLE: Single wafer cleaning with ozone

PUBLICATION-DATE: June 3, 2004

## INVENTOR-INFORMATION:

| NAME           | CITY      | STATE | COUNTRY |
|----------------|-----------|-------|---------|
| Kenny, Michael | Kalispell | MT    | US      |
| Aegeter, Brian | Kalispell | MT    | US      |
| Bergman, Eric  | Kalispell | MT    | US      |
| Scranton, Dana | Kalispell | MT    | US      |

US-CL-CURRENT: 134/19; 134/102.1, 134/105, 134/25.4, 134/26, 134/31, 134/33,  
134/902, 257/E21.228, 257/E21.229

## ABSTRACT:

In a system for cleaning a workpiece or wafer, a boundary layer of heated liquid is formed on the workpiece surface. Ozone is provided around the workpiece. The ozone diffuses through the boundary layer and chemically reacts with contaminants on the workpiece surface. Preferably, the liquid includes water, and may also include a chemical. Steam may also be used with the steam also physically removing contaminants, and also heating the workpiece to speed up chemical cleaning. Sonic or electromagnetic energy may also be introduced to the workpiece.

|      |       |          |       |        |                |      |           |           |             |        |      |         |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|---------|
| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|------|---------|

☐ 4. Document ID: US 20040035448 A1

L12: Entry 4 of 21

File: PGPB

Feb 26, 2004

PGPUB-DOCUMENT-NUMBER: 20040035448  
PGPUB-FILING-TYPE: new  
DOCUMENT-IDENTIFIER: US 20040035448 A1

TITLE: Selective treatment of microelectronic workpiece surfaces

PUBLICATION-DATE: February 26, 2004

INVENTOR-INFORMATION:

| NAME               | CITY      | STATE | COUNTRY |
|--------------------|-----------|-------|---------|
| Aegerter, Brian K. | Kalispell | MT    | US      |
| Dundas, Curt T.    | Kalispell | MT    | US      |
| Ritzdorf, Tom L.   | Big Fork  | MT    | US      |
| Curtis, Gary L.    | Loveland  | CO    | US      |
| Jolley, Michael    |           |       | US      |

US-CL-CURRENT: 134/33; 257/E21.309

ABSTRACT:

This invention provides a process for treating a workpiece having a front side, a back side, and an outer perimeter. In accordance with the process, a processing fluid is selectively applied or excluded from an outer peripheral margin of at least one of the front or back sides or the workpiece. Exclusion and/or application of the processing fluid occurs by applying one or more processing fluids to the workpiece as the workpiece and corresponding reactor are spinning about an axis of rotation that is generally orthogonal to the center of the face of the workpiece being processed. The flow rate of the one or more processing fluids, fluid pressure, and/or spin rate are used to control the extent to which the processing fluid is selectively applied or excluded from the outer peripheral margin.

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| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KMC | Draw De |
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☐ 5. Document ID: US 20040031503 A1

L12: Entry 5 of 21

File: PGPB

Feb 19, 2004

PGPUB-DOCUMENT-NUMBER: 20040031503  
PGPUB-FILING-TYPE: new  
DOCUMENT-IDENTIFIER: US 20040031503 A1

TITLE: Substrate treatment apparatus and substrate treatment method

PUBLICATION-DATE: February 19, 2004

INVENTOR-INFORMATION:

| NAME           | CITY  | STATE | COUNTRY |
|----------------|-------|-------|---------|
| Eitoku, Atsuro | Kyoto |       | JP      |

US-CL-CURRENT: 134/2; 134/1, 134/157, 134/26, 134/28, 134/33, 134/56R, 134/95.1,  
134/95.3, 257/E21.228



## ABSTRACT:

A substrate treatment apparatus for removing an unnecessary substance from a surface of a substrate. The apparatus is provided with: an oxidation liquid supply mechanism for supplying an oxidation liquid having an oxidative effect to the substrate surface; a physical cleaning mechanism for physically cleaning the substrate surface; and an etching liquid supply mechanism for supplying an etching liquid having an etching effect to the substrate surface. It is preferred to physically clean the substrate surface while supplying the oxidation liquid to the substrate surface.

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|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|-----|--------|
| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KMC | Draw D |
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☐ 6. Document ID: US 20040020513 A1

L12: Entry 6 of 21

File: PGPB

Feb 5, 2004

PGPUB-DOCUMENT-NUMBER: 20040020513

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20040020513 A1

TITLE: Methods of thinning a silicon wafer using HF and ozone

PUBLICATION-DATE: February 5, 2004

## INVENTOR-INFORMATION:

| NAME             | CITY      | STATE | COUNTRY |
|------------------|-----------|-------|---------|
| Bergman, Eric J. | Kalispell | MT    | US      |

US-CL-CURRENT: 134/2; 134/30, 134/31, 134/902, 257/E21.228, 257/E21.229, 257/E23.054

## ABSTRACT:

A method of thinning a silicon wafer in a controllable cost-effective manner with minimal chemical consumption. The wafer is placed into a process chamber, after which ozone gas and HF vapor, are delivered into the process chamber to react with a silicon surface of the wafer. The ozone and HF vapor may be delivered sequentially, or may be mixed with one another before entering the process chamber. The ozone oxidizes the silicon surface of the wafer, while the HF vapor etches the oxidized silicon away from the wafer. The etched oxidized silicon is then removed from the process chamber. As a result, the wafer is thinned, which aids in preventing heat build-up in the wafer, and also makes the wafer easier to handle and cheaper to package. In alternative embodiments, HF may be delivered into the process chamber as an anhydrous gas or in aqueous form.

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| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KMC | Draw D |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|-----|--------|

☐ 7. Document ID: US 20030205240 A1

L12: Entry 7 of 21

File: PGPB

Nov 6, 2003

PGPUB-DOCUMENT-NUMBER: 20030205240  
PGPUB-FILING-TYPE: new  
DOCUMENT-IDENTIFIER: US 20030205240 A1

TITLE: Apparatus for treating a workpiece with steam and ozone

PUBLICATION-DATE: November 6, 2003

INVENTOR-INFORMATION:

| NAME             | CITY      | STATE | COUNTRY |
|------------------|-----------|-------|---------|
| Bergman, Eric J. | Kalispell | MT    | US      |

US-CL-CURRENT: 134/3; 257/E21.228, 257/E21.229, 257/E23.054

ABSTRACT:

In a method for processing a workpiece to remove material from a first surface of the workpiece, steam is introduced onto the first surface under conditions so that at least some of the steam condenses and forms a liquid boundary layer on the first surface. The condensing steam helps to maintain the first surface of the workpiece at an elevated temperature. Ozone is provided around the workpiece under conditions where the ozone diffuses through the boundary layer and reacts with the material on the first surface. The temperature of the first surface is controlled to maintain condensation of the steam.

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| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KMC | Draw. De |
|------|-------|----------|-------|--------|----------------|------|-----------|-----------|-------------|--------|-----|----------|

☐ 8. Document ID: US 20020157686 A1

L12: Entry 8 of 21

File: PGPB

Oct 31, 2002

PGPUB-DOCUMENT-NUMBER: 20020157686  
PGPUB-FILING-TYPE: new  
DOCUMENT-IDENTIFIER: US 20020157686 A1

TITLE: Process and apparatus for treating a workpiece such as a semiconductor wafer

PUBLICATION-DATE: October 31, 2002

INVENTOR-INFORMATION:

| NAME           | CITY      | STATE | COUNTRY |
|----------------|-----------|-------|---------|
| Kenny, Michael | Kalispell | MT    | US      |
| Aegeter, Brian | Kalispell | MT    | US      |
| Bergman, Eric  | Kalispell | MT    | US      |
| Scranton, Dana | Kalispell | MT    | US      |

US-CL-CURRENT: 134/1.3; 134/153, 134/21, 134/28, 134/30, 134/33, 134/34, 134/902, 134/95.3, 257/E21.228, 257/E21.229, 257/E23.054

ABSTRACT:

In a system for cleaning a workpiece or wafer, a boundary layer of heated liquid is formed on the workpiece surface. Ozone is provided around the workpiece. The ozone diffuses through the boundary layer and chemically reacts with contaminants on the workpiece surface. A jet of high velocity heated liquid is directed against the workpiece, to physically dislodge or remove a contaminant from the workpiece. The jet penetrates through the boundary layer at the point of impact. The boundary layer otherwise remains largely undisturbed. Preferably, the liquid includes water, and may also include a chemical. Steam may also be jetted onto the workpiece, with the steam also physically removing contaminants, and also heating the workpiece to speed up chemical cleaning. The workpiece and the jet of liquid are moved relative to each other, so that substantially all areas of the workpiece surface facing the jet are exposed at least momentarily to the jet. Sonic or electromagnetic energy may also be introduced to the workpiece.

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. De |
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☐ 9. Document ID: US 20020050279 A1

L12: Entry 9 of 21

File: PGPB

May 2, 2002

PGPUB-DOCUMENT-NUMBER: 20020050279

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20020050279 A1

TITLE: Process and apparatus for treating a workpiece with hydrofluoric acid and ozone

PUBLICATION-DATE: May 2, 2002

INVENTOR-INFORMATION:

| NAME             | CITY      | STATE | COUNTRY |
|------------------|-----------|-------|---------|
| Bergman, Eric J. | Kalispell | MT    | US      |

US-CL-CURRENT: 134/3; 134/19, 134/2, 134/26, 134/28, 134/30, 134/31, 134/32, 134/33, 134/34, 134/35, 134/41, 257/E21.228 , 257/E21.229

ABSTRACT:

A workpiece or substrate is placed in a support in a reaction chamber. A heated process liquid is sprayed onto the substrate. The thickness of the layer of process liquid formed on the substrate is controlled, e.g., by spinning the substrate. Ozone is introduced into the reaction chamber by injection into the liquid or into the reaction chamber, while the temperature of the substrate is controlled, to chemically process the substrate. The substrate is then rinsed and dried.

| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw. De |
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☐ 10. Document ID: US 20020020436 A1

L12: Entry 10 of 21

File: PGPB

Feb 21, 2002

PGPUB-DOCUMENT-NUMBER: 20020020436  
PGPUB-FILING-TYPE: new  
DOCUMENT-IDENTIFIER: US 20020020436 A1

TITLE: Process and apparatus for treating a workpiece with steam and ozone

PUBLICATION-DATE: February 21, 2002

INVENTOR-INFORMATION:

| NAME             | CITY      | STATE | COUNTRY |
|------------------|-----------|-------|---------|
| Bergman, Eric J. | Kalispell | MT    | US      |

US-CL-CURRENT: 134/30; 134/19, 134/2, 134/26, 134/28, 134/3, 134/31, 134/35,  
134/36, 134/37, 134/41, 134/42, 257/E21.228 , 257/E21.229

ABSTRACT:

In a method for processing a workpiece to remove material from a first surface of the workpiece, steam is introduced onto the first surface under conditions so that at least some of the steam condenses and forms a liquid boundary layer on the first surface. The condensing steam helps to maintain the first surface of the workpiece at an elevated temperature. Ozone is provided around the workpiece under conditions where the ozone diffuses through the boundary layer and reacts with the material on the first surface. The temperature of the first surface is controlled to maintain condensation of the steam.

|      |       |          |       |        |                |      |           |           |             |        |      |        |
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| Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | K00C | Draw D |
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|------------------------------------|-----------|
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| 134/1                              | 1718      |
| 134/10                             | 1174      |
| "134/100.1"                        | 278       |
| "134/102.1"                        | 557       |
| "134/102.2"                        | 250       |
| "134/102.3"                        | 140       |
| "134/103.1"                        | 261       |
| "134/103.2"                        | 321       |
| "134/103.3"                        | 62        |
| "134/104.1"                        | 284       |
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